STEP-UP VOLTAGE REGULATORS

500W to 2.32kW - Efficiency: 92 to >98%

Small size - DIN rail or wall mounting

www.elecdan-converter.com

Dynamic dissipation

Case ① 250cm³ / 380g

Independent **passive** dissipation

Case ② 100cm³ / 290g

Reinforced **passive** dissipation

Case ④ 1000cm³ / 1150g
(Case ② + dissipator "225")

Standard **passive** dissipation

Case ③ 500cm³ / 700g
(Case ② + dissipator "112")

❶ Goal

Able to convert a low voltage into higher voltage, within a reduced volume, and with a high efficiency (from 92 to more than 98%), these step-up can advantageously replace conventional dc/dc converters (2) when input/output insulation is not required.
Moreover, if your starting current is very high, our technique of elevation enables the switching – almost directly and immediately – from the source (battery) to the load, while a typical converter can collapse. Reinforced switch diode available on request.

Examples:

- **To transform a 12V battery into a powerful stabilized generator 15V / 900W or 24V / 576W**
- **To power a vehicle with 24V/600W from the 10 to 20V of its fuel-cell**
- **To operate a solar pump at constant speed, under 24V/1.2kW, from 18 to 23V**
- **To stabilize, at 400V/2kW, a 370V generator whose voltage varies from 345V to 395V**
- **To overcome the high starting current of an engine (ex: Maxon 24V / 9.15A / 212A) from a 12V battery**

❷ General presentation

The active part of the regulator (i.e. not counting high-performance screw connectors for wires of section ≤ 72mm²) **measures 64 x 64 mm, and is thus compatible with regular half-brick modules. Depending on the cooling method (dynamic or passive) chosen by the customer when ordering, *the complete regulator* shall have one of the 4 following shapes:**

① *Integrated* dynamic cooling Case ① : **equipped with a small built-in fan, fast racking-out for fan replacement directly by the user after 50,000 hours (this case ① is 4 times smaller than case ④, which is of the same power but cooled by natural convection)**

② *Independant* passive dissipation Case ② : **the user places the elevator's thermal interface against a heat conducting wall whose thermal resistance is ≤ 1.5°/W**

③ *Standard* passive dissipation Case ③ : **case ② equipped with a "112" dissipator can be mounted on DIN rail; *enhanced* cooling if the whole unit is screwed on a heat conducting wall**
***N.B.*: the picture represents the regulator ② deeply embedded in its "112" dissipator**

④ *Reinforced* passive dissipation With "225" dissipator (2 times longer than "112", same section)

(1) patent registration: 2012 ; trademark: 2014 (2) see also our isolated dc/dc converters, from 15W to 2kW, and our analog signal converters

❸ Electrical data

- Power output (Pout): from 500W up to 2.32kW with twelve product references
- Input voltage "Vin": ranging from 10V to 400V dc depending on the unit as seen on table ❿
- Common input and output, occupying the 2 "-" connection terminals
- Output voltage "Vout": ranging from de 15V to 400V (always higher than the maximum input voltage)
- Input currents: 95A max (unit 10V to 14V ➔ 15V / 900W)
- No-load current: ≤ 6W / Vin ; fan's power on case ① : ≈ 5W
- Minimum load current: zero to ≤100mA depending on the model
- Line+load regulation: better than 2%; dynamic answer < 5% / <50ms
- Efficiency at full load: 92% to >98%, depending on the model
- Ripple: less than 1% of Vout; fixed switching frequency > 200kHz

❹ Protections

- Limited overloads: as long as decreasing Vout remains ≥ Vin + 0.5V
- *Abnormal* overloads: please add a fuse or current-limiter on the output or input
- Under-voltage or sufficient input over-voltage: the regulator no longer elevates the input voltage
- Filters: input and output; shields: two parallel metallic plates
- Thermal protection: lowering of Vout to ≈ Vin - 0.5V (automatic reset)
- Vibrations, tropicalisation, IP63 to IP67 sealing, except the fan. ***Stainless*** steel for the high-performance wire-connectors
- Ohmic wire loss reduction, with connectors receiving sections up to 72mm^2
- The dynamic dissipation model is equipped with a highly reliable fan (50,000 hours)

❺ Thermal characteristics (see table ⓭ with curves to read losses depending on ambient temperature)

- All models can work with ambient temperature from -40°C up to +90°C at decreasing power (except the dynamic dissipation model: from -30°C to +70°C)
- Models ①, ③ and ④ can work at half-power when the temperature ≥ 60°C
- Storage temperature: -40°C to +100°C for models ②, ③ and ④
- Temperature coefficient: 2.10^{-4} / °C

❻ Options on request

- Remote sensing: 2 miniature connection points
- Shifting of the input range: 3 connections (please contact us for further details)
- Other input and output voltages ≤ 400V
- Other output powers, below 2.32kW
- Inhibition of the "step-up" function: 2 connections
- Control of the current limitation on the "step-up" range
- Customizable colors and texts for cases
- Reinforced switch diode for very high starting current

❼ Mechanical presentation: 4 configurations (see ❷ + ⓫ and the 4 pictures below)

- Case ① 250cm^3 / 380g / 96 x 64 x thickness 61 mm; equipped with an integrated dynamic cooling
- Case ② 100cm^3 / 290g / 92 x 64 x thickness 40 mm; ***alone*** (without dissipator); screwable on a functional dissipating wall or on one of the two available dissipators (length 112.6mm or 225.2mm)
- Case ③ 500cm^3 / 700g / 112.6 x 120 x thickness 47 mm; case ② deeply ***embedded*** in the **short** dissipator; with clip on the back for DIN rail Ω (or with lateral side clip upon request)
- Case ④ 1000cm^3 / 1150g / 225.2 x 120 x thickness 47 mm; case ② deeply ***embedded*** in the **long** dissipator; with clip on the back for DIN rail Ω (or with lateral side clip upon request)

❽ Mechanical specifications

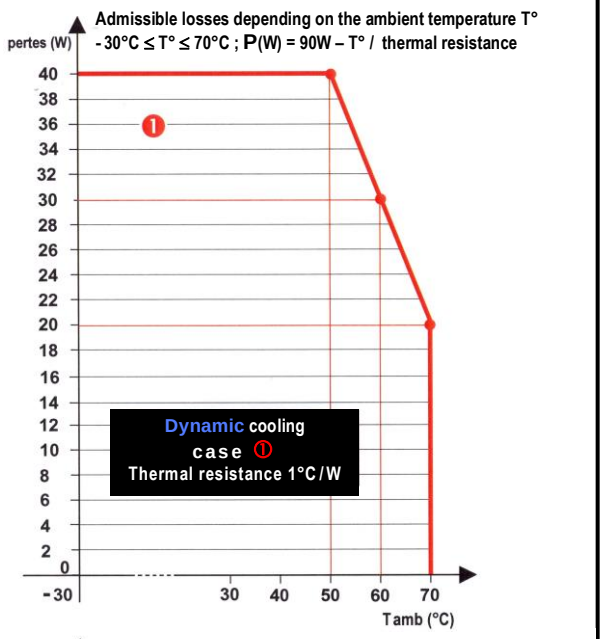
- Connections through large high-performance connectors enabling wire sections up to 72mm^2
- Fan (MTBF 50,000 h) included in case ① "250cm^3": easily dismountable
- All cases can be fixed on a wall with two screws (center distances: 85/90/48.2 x 50.8mm)
- High volume saving if the user already has a thermally dissipating functional wall

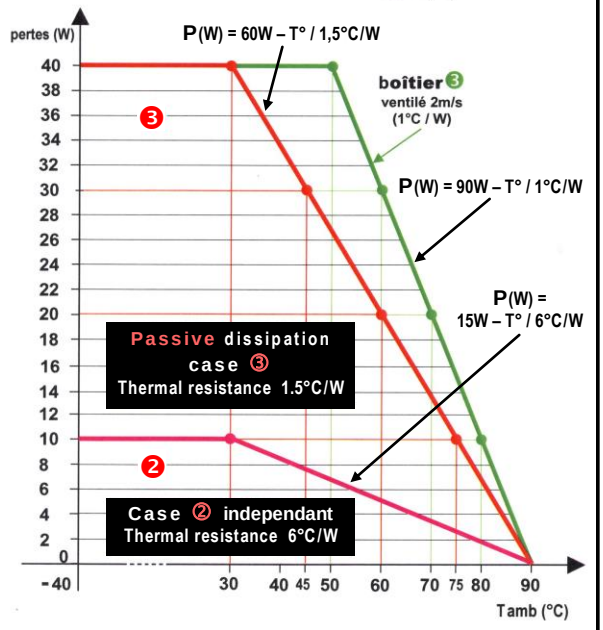
❾ Standards and specifications

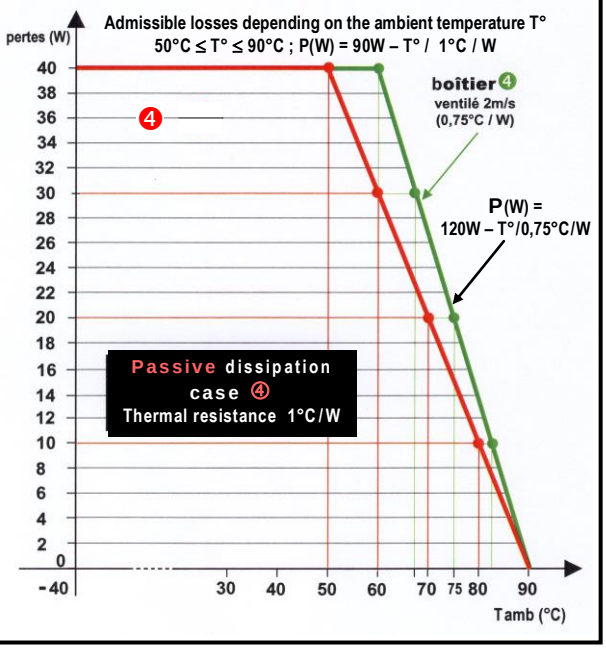
- Marking CE/UL 60950-1 / EN 60950-1 / IEC 60950-1 / RoHS / 55022A if optional external filter
- Flammability: horizontal test for electrical applications, according to UL 94 HB standard
- MTBF (case at 50°C): passive dissipation models >120,000 hours / dynamic version with fan: 50,000 hours
- Worldwide manufacturers for active parts. Patent, assembling and final controls: *ELECDAN Converter*

13 *Maximum* **ambient** temperature for the 4 models, depending on losses.

Result from graphic display or lineal equation.







10 Step-Up Voltage Regulator 500W to 2.32kW and main SKU

No.	1 Input voltage (V)	2 Output Voltage (V)	2 Output Current (A)	3 Power rating (W)	4 Efficiency	5 Max. loss (W)	6 SKU the last digit to be added is the case number
1	10 to 14	15	60	900	> 0.95	40	SUR-1014-1560….
2		24	24	576	> 0.94	40	SUR-1014-2424….
3		28	18	500	> 0.92	40	SUR-1014-2818….
4	10 to 20	24	25	600	> 0.94	38	SUR-1020-2425….
5		28	18	500	> 0.92	40	SUR-1020-2818….
6	18 to 23	24	50	1200	> 0.96	40	SUR-1823-2450….
7		28	25	700	> 0.95	32	SUR-1823-2825….
8	20 to 28	36	20	720	> 0.94	40	SUR-2028-3620….
8a	20 to 28	48	12.5	600	> 0.95	32	SUR-2028-48-12.5….
9	36 to 46	56	12.5	700	> 0.95	32	SUR-3646-56-12.5….
10	45 to 56	58	40	2320	> 0.98	30	SUR-4556-5840….
10a	46 to 52	60	50	3000	0.99	31	SUR-4652-6050….
11	54 to 69	72	18	1296	> 0.97	40	SUR-5469-7218….
11a	40 to 56	72	14	1000	> 0.97	31	SUR-4056-7214….
12	345 to 395	400	5	2000	> 0.98	36	SUR-345395-4005….

Other voltages, currents, powers, presentations: ***upon request***
Example: 12 to 16V → 24V / 58A / 1400W / efficiency: 0.94 / loss: 90W / brick size

11 Physical characteristics of the 4 cases and last digit for SKU

Case No.	Cooling	Dimensions (mm) Length	Width	Thick.	Volume without connectors (cm^3)	Weight (g)	Thermal resistance	Back mounting Clip Ω 35 mm	2 screws / center distance	SKU
1	Dynamic	96	64	61	250	380	1°C / W	built-in	Ø 4,5 mm / 85 mm	1
2	Independent passive	92	64	40	100	290	6°C / W	no	M3 48,2 x 50,8 mm	2
3	Standard passive	112.6	120	47	500	700	1.5°C / W	added *also possible laterally*	Ø 4,5 mm / 90 mm	3
4	Reinforced passive	225.2	120	47	1000	1150	1°C / W			4

High-performance wire-connectors (bridge contact) **for sections ≤ 72 mm^2**

12 ***Graphical*** determination of max. possible ambiant temperature (T°)

- **Please see on table 10 the order number** (1 to 12) **of the unit** and **note the corresponding maximum loss from column 5**
- **Then check the thermal curve at 13 for the selected case number** (1 to 4) **as on table 11**
- **The loss P**(W) **is proportional to the output power from zero to the maximum value:**
  P(W) **= max. loss x output power / power rating**
- **We read the max. possible ambient temperature from the intersection of the horizontal "loss" with the curve.**

Examples:

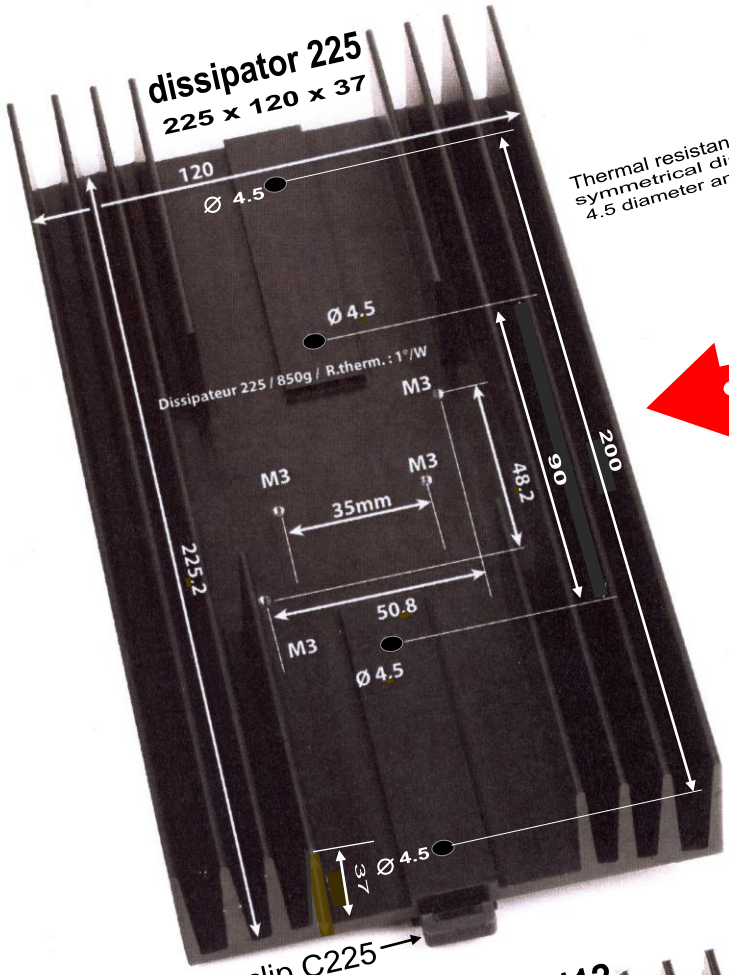
1/ The step-up model "10 à 14V → 15V / 60A / 900W" has a maximum loss of 40W.
At half-power (loss 20W), for case ④, the max. ambient temperature should be: 70°C
At one fourth power (loss 10W), the maximum ambient temperature should be: 80°C

2/ For model No. 10 (58V / 40A / 2320W) with case ①, max. ambient temperature: 60°C at full power (loss 30W) or 70°C at 2/3 power (loss 20W).

14 Complete SKU Step-Up Regulator	SKU for separate accessories	
Function + Case type	**Dissipator alone**	**Matching Clip**
table 10 + table 11	"112" or "225" (version "S": see § 15)	C112 C225 C 37

Example of SKU for a dynamic cooling case:
No. 1 table 10 6 + No.1 table 11 → SKU: SUR-1014-1560-1

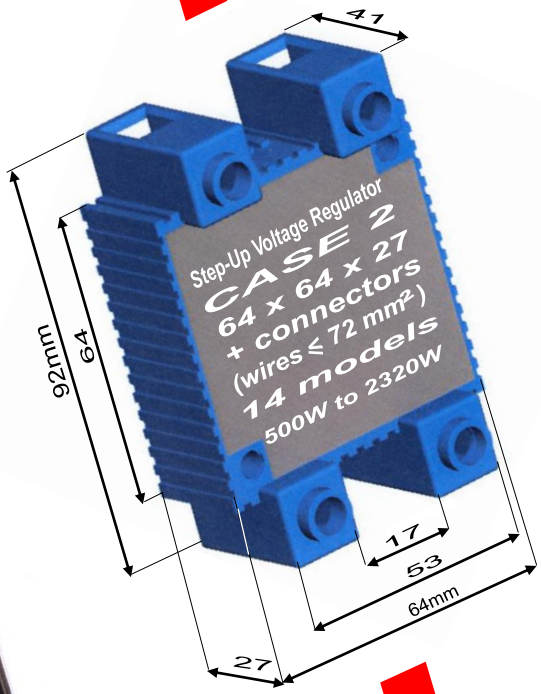
⓯ Possible pairings from case ❷ of any Step-Up Voltage Regulator

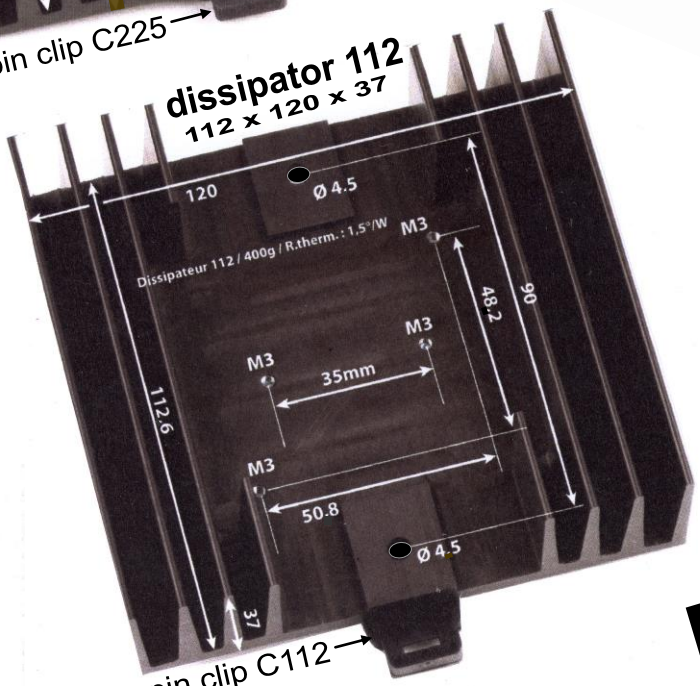


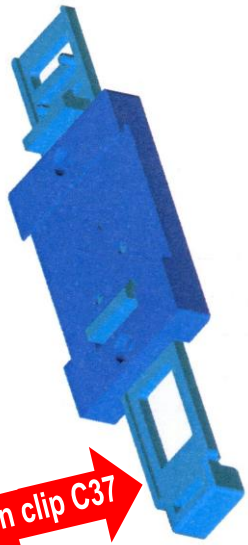
Thermal resistances (1.5 and 1°C/W) can be decreased by half, by adding a symmetrical dissipator (112S or 225S), back to back ; linked through 4.5 diameter and M4. Mounting clip embedded in the symmetrical dissipator.

Accessories upon request	
Clip C 37	112
	225
Dissipator 112	
Dissipator 225	
Dissipator 112S	
Dissipator 225S	
Clip C	112
	225

embedding







pin clip C37

special, optional, mountable on the lateral sides (thickness 37mm) of the dissipators : fixing with 2 symmetrical M3 (central distance 50mm)

embedding

CHOICE

4 inserts M3 on base plate (center distances : 50.8 x 48.2mm) for customer's frame

thermal resistance <1.5°/ W

thermally dissipating wall